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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/838,810	04/20/2001	Paul F. Struhsaker	WEST14-00005	2942
7590	07/07/2004		EXAMINER	
Docket Clerk P.O. Drawer 80089 Dallas, TX 75380			VARTANIAN, HARRY	
			ART UNIT	PAPER NUMBER
			2634	
			DATE MAILED: 07/07/2004	10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/838,810

Applicant(s)

STRUHSAKER ET AL.

Examiner

Harry Vartanian

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 29 March 2002.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-18 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 20 January 2001 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some *
 - c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5.9.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

Detailed Action

Claim Objections

1. Claims 1 and 10 recites the limitation "said first signal estimate sequence". There is insufficient antecedent basis for this limitation in the claim. The applicant is not correctly using the word "said" to refer to already named components in the claim. 35 U.S.C. § 112 2nd paragraph says that the word "said" *must be used to refer directly to a previously introduced element/step. It can be presented in an abbreviated form as long as there is no conflict with other named elements/steps.* In most cases, the use of the word said must be a word for word match to the previously mentioned element or step. **A simple fix would be to recite "said first symbol estimate sequence".** Appropriate correction is required.
2. Claims 1 and 10 recites the limitation "said second signal estimate sequence". There is insufficient antecedent basis for this limitation in the claim. **A simple fix would be to recite "said second symbol estimate sequence".** Appropriate correction is required.
3. Claim 2-3 and 11-12 objected to because of the following informalities: the recitation "said block of said N symbols" can simply be stated as "said block of N symbols". Appropriate correction is required.
4. Claim 6 and 15 recites the limitation "said feedback filter". There is insufficient antecedent basis for this limitation in the claim. **A simple fix would be to recite "said time domain feedback filter".** Appropriate correction is required.

Art Unit: 2634

Drawings

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "350" has been used to designate both an antenna and OFDM receiver. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "355" has been used to designate both an antenna and N FFT processors. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance. PLEASE CAREFULLY LOOK AT PARAGRAPH 0104 FOR LABELING ERRORS. SIMPLE SOULTION WOULD BE TO RELABEL RECEIVE ANTENNA TO 351.

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:507. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

Art Unit: 2634

matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claim 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al(US Patent #6,643,321) in view of Fuhrmann et al (US Patent #5,991,308).

Genossar et al's Base station for POINT TO MULTI-POINT communications meets the following limitations of Claim 1:

a receiver front-end capable of receiving data burst transmissions from said plurality of subscriber transceivers in an uplink portion of a TDD channel, **fig 1, 2; (Column 1, Lines 15-36)**

wherein said receiver front-end demodulates said received data burst transmissions into a digital baseband signal in-phase (I) signal and a digital baseband quadrature (Q) signal; **fig 2;**

In Column 10, Line 63 to Column 11, Line 6 Genossar et al describes the use of a decision feedback equalizer and shows one in fig 2 item 54, but does not specifically state the use of the feed-forward, feed-back, adder, and slicer components typically found in such a equalizer. He also fails to teach the use of a FFT.

However, Fuhrmann et al meets the following limitations of the Claim:

a first frequency domain feedforward equalization filter capable of receiving said I signal and performing a Fast Fourier Transform on a block of N symbols in said I signal to produce a first symbol estimate sequence; **fig 37; use of fft in (Column 114, lines 19-34)**

a second frequency domain feedforward equalization filter capable of receiving said Q signal and performing a Fast Fourier Transform on a block of N symbols in said Q signal to produce a second symbol estimate sequence; **fig 37; use of fft in (Column 114, lines 19-34)**

an adder capable of receiving said first signal estimate sequence on a first input and said second signal estimate sequence on a second input and producing a combined symbol estimate sequence; **fig 37, item 925**

Art Unit: 2634

a slicer capable of receiving and quantizing said combined symbol estimate sequence to produce a sequence of decided symbols; and (**column 85, line 21 to column 86, line 50**)

a time domain feedback filter capable of receiving said sequence of decided symbols and generating a symbol correction sequence that is applied to a third input of said adder. (**column 85 line 21 column 86, line 50) fig 37, item 925**

Moreover, regarding the use of two feed-forward equalizers and a third input is implied by Genossar et al since he shows that his receiver demodulates the incoming RF signal into I and Q components and THEN equalizes them using item 54, which he states could be a DFE. Therefor, it would have been obvious to those skilled in the art at the time the invention was made for Genossar et al's DFE to have the components stated by Fuhrmann et al. The motivation to combine is that a feed-forward equalizer, feedback equalizer, adder, and slicer are the well-known essential building blocks of a DFE. The use of a FFT is admitted prior art by the applicant in figure 3B and is a well known component of a OFDM receiver.

Regarding Claim 10, the limitation of using the receiver in a basestation is met by Genossar et al in figure 1. Therefor the rejection for Claim 1 above meets that of Claim 10.

9. Claims 2-3 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al(US Patent #6,643,321) in view of Fuhrmann et al (US Patent #5,991,308) furtherer in view of Wang(US Patent #5815529). Genossar et al and Fuhrmann et al meet all the limitation's of the Claim except describing the frequency domain spacing of the feed-forward filter.

However, Wang meets the following limitations of the Claims 2-3 and 11-12:

frequency domain feedforward equalization filter is $2/T$ fractionally spaced, where T is a period of said block of said N symbols. (**Column 10, line 66 to Column 11, Line 31**)

Therefor it would have been prima facie obvious for Genossar et al, Fuhrmann et al, and Wang to be combined. The motivation to combine is that $2/T$ spacing is needed to meet the nyquist criterion. More specifically, in communication theory:

$$2 * BW = Data\ Rate$$

$$Data\ Rate = 1/T$$

$$Therefore 2/T = BW$$

10. Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al(US Patent #6,643,321) in view of Fuhrmann et al (US Patent #5,991,308) furtherer in view of Juntti (US Patent #5,835,526). Genossar et al and Fuhrmann et al meet all the limitation's of the Claims except describing the feedback filter having delay taps.

However, Juntti discloses in figure 2 that his DFE has a delay line. Therefor it would have been *prima facie* obvious for Genossar et al, Fuhrmann et al, and Juntti to be combined. The motivation to combine is that it is well known in the art that a fundamental component of a filter/equalizer are delay taps.

11. Claim 5-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al(US Patent #6,643,321) in view of Fuhrmann et al (US Patent #5,991,308). Genossar et al and Fuhrmann et al meet all the limitation's of the Claims except describing the exact structure of the feedback filter. However, the number of tap delays and tap coefficients used in the feedback filter is a design choice since it is dependent on the exact channel characteristics and receiver performance goals.

12. Claim 7-8 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al(US Patent #6,643,321) in view of Fuhrmann et al (US Patent #5,991,308) furtherer in view of Webster et al (US Patent #6,661,857). Genossar et al and Fuhrmann et al meet all the limitation's of the Claims except using a preamble as a training sequence for the DFE.

However, Webster et meets the following limitations of the claims:

Art Unit: 2634

a channel estimation circuit capable of detecting a preamble sequence of symbols in at least one of said I and Q signals and producing therefrom a first plurality of feedforward coefficients usable by said first frequency domain feedforward equalization filter. (**Column 2, Lines 20-42**); **fig 1**

channel estimation circuit produces a second plurality of feedforward coefficients usable by said first frequency domain feedforward equalization filter. (**Column 2, Lines 20-42**); **fig 1**

Therefor it would have been *prima facie* obvious for Genossar et al, Fuhrmann et al, and Webster et al to be combined. The motivation to combine is stated by Webster in column 1, lines 6-15 where he states that using the preamble as the training sequence can result in the channel "to be rapidly estimated."

13. Claim 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Genossar et al(US Patent #6,643,321) in view of Fuhrmann et al (US Patent #5,991,308) furtherer in view of Quigley et al (US Patent #6,650,624). Genossar et al and Fuhrmann et al meet all the limitation's of the Claims except using a block of 16 symbols.

However, Quigley et al meets the following limitations of the claim:

wherein N=16. (**Column 62, lines 38-45**)

The motivation to combine is that choosing the block size is a design choice. Moreover, it has been established that a change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 703.305.8698. The examiner can normally be reached on 9-5:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703.305.4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian
Examiner
Art Unit 2634

HV



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